

CONTINUOUS-PHASE OSCILLATOR WITH ULTRA-FINE FREQUENCY RESOLUTION

ABSTRACT OF THE DISCLOSURE

A high-resolution DDS coupled to a phase-locked-loop (PLL) is provided that tracks the output of the DDS. The output of the PLL is provided to a synthesizer that scales the frequency from the PLL to the desired output frequency. When used to track the output of a DDS at a substantially fixed frequency, the PLL provides an output also at a substantially fixed frequency. The frequency translation of this PLL is chosen such that it allows the DDS to operate at an output frequency range that is spectrally pure. This DDS frequency range is determined either through analysis or found empirically. Once the PLL is 'locked' onto the output of the DDS, the output spectrum is filtered by the loop-filter of the PLL, and thus provides a very narrow bandpass filtering effect. If the DDS frequency is changed, the PLL provides a gradual change to the new frequency, thereby providing a gradual phase change through the transition. Consideration of the PLL loop-filter bandwidth and damping factor allow the designer to closely approximate the desired output frequency step response time. Through the transition, the PLL continues to provide a very narrow bandpass filtering effect, thereby providing a narrowband filter whose center frequency varies with the desired output frequency across a relatively wide range.